(2)

USERS AND OPERATIONS MANUAL
FOR
ARCTIC AMBIENT NOISE PREDICTION SYSTEM

Contract N00014-86-D-0137
SAIC Contract 1-425-03-663

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Arctic Ambient Noise Prediction System

Users and Operations Manual

Contract N00014-86-D-0137
SAIC Project 1-425-03-663

Prepared for
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31 January 1988

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Section 1. General

1.1 Purpose of the Users and Operations Manual.

The objective of this users and operations manual for the Arctic Ambient Noise Prediction System (project number N00288-84-D-3010 7R-15) is 1) to provide the U. S. Navy's Fleet Numerical Oceanography Center (FNOC) non-ADP personnel with the information necessary to effectively use this prediction system and 2) to provide computer control and operator personnel with a detailed operational description of the system and its associated environment with which they will be concerned during the performance of their duties.

1.2 Project References.

The Arctic Ambient Noise Prediction computer programs are of a tactical and management information nature, and provide estimates of the intensities of under-ice noise in the Arctic. These estimates are based on empirical relationships between ice motion and noise levels. The ice motion is predicted from the U. S. Navy's Polar Ice Prediction System (PIPS), and the noise intensities for regions throughout the arctic are used as indications of where noise levels are high (or low) and the duration of noise events. The project sponsors for this work are FNOC and the Naval Oceanographic Office (NAVOCEANO). The programs are set up to run on the FNOC computer facilities.

A number of documents pertain to this work. These include background papers on the numerical ice model, the operational features of PIPS, and the empirical relationships between ice motion and under-ice noise:

Hibler, W. D., III, 1979: A dynamic thermodynamic sea ice model. J. Phys. Oceanogr., 9, 815-846. (Unclassified)

Preller, R., 1985: The NORDA/FNOC polar ice prediction system (PIPS) - Arctic: a technical description. NORDA Rpt. 108, Naval Ocean Research and Development Activity, NSTL Station, Miss., 50 pp. (Unclassified)

Tucker, W. B., And W. D. Tucker, III, 1986: An evaluation of the Polar Ice Prediction System - phase 1. Tech. Note, Cold Regions Research Engineering Lab., Hanover, New Hamp., 26 pp. (Unclassified)

Lewis, J. K., 1986: Calculation of under-ice ambient noise from model predicted ice drift in the arctic: program specification and maintenance manual. Rpt. to FNOC from Sci. Appl. Int'l. Corp., Monterey, Ca., 21 pp.

Lewis, J. K., and W. W. Denner, 1986: A study of sea ice kinematics and their relationships to arctic ambient noise. Science Appl. Int'l. Corp. Rpt. to the Off. Naval Res., Rpt. Num. SAIC-85/1950, 770 pp. (Unclassified)

Buck, B. M., and M. W. Clarke, 1986: Arctic Ambient Noise Level Statistics Based on NIUMBU-6 RAMS and NOAA-ARGOS Ambient Noise Data Buoys, 1965-1985. U.S. Naval Oceanographic Office, Acoustics Projects Division, NSTL Station, Miss. 57 pp. (Unclassified)

Fleet Numerical Oceanography Center computer user guide, Edition 2 (change 16). (Unclassified)

1.3 Terms and Abbreviations.

The following is a list of terms, definitions, and acronyms pertinent to this document.

PIPS - Polar Ice Prediction System: FNOC's system for forecasting ice in the Arctic Ocean.

Arctic ambient noise: noise in the water column under sea ice that is typically generated by various processes affecting the ice.

DKP - Differential Kinematic Parameter

IKP - Ice Kinematic Parameters: a reference to the 5 basic modes of motion as they pertain to ice: translation, divergence, vorticity, normal deformation rate, and shear deformation rate.

Translation: spatial displacement per unit time (velocity) of a parcel of ice.

Divergence: fraction of area change per unit time (second) of a parcel of ice.

Vorticity: rotation rate (second) of a parcel of ice.

Normal deformation rate: shape change per unit time (second) due to forces acting normal to the perimeter of a parcel of ice.

Shear deformation rate: shape change per unit time (second) due to forces acting perpendicular to the perimeter of a parcel of ice.

Ice edge: ice that is on the ice/water boundary.

JCL - Job Control Language.

1.4 Security.

None of the documents or the results of previous research pertaining to this system are classified. This system accesses output data from PIPS (UNCLAS) and the U.S. Navy Shipping Noise Data Base (USNSNDB) (CONFIDENTIAL). The software tests for the classification level of the computer in use and will access the USNSNDB only if the computer is classified. Access to classified data is under control of FNOC.

Section 2. System Summary

2.1 System Application.

The purpose of the Arctic Ambient Noise Prediction system is to provide estimates of under-ice noise levels for fleet purposes. Noise characteristics for icy waters can be significantly different from the rest of the world's oceans. Thus, this system was developed to provide estimates of under-ice noise intensities throughout the Arctic Basin.

The basis for the system relies on the fact that, as ice moves, changes temperature, or is stressed in other fashions, noise is generated. This noise is transmitted to the water column over a range of frequencies. Various studies have related ice motion to noise levels at different frequencies, and prediction algorithms have been developed that relate noise levels to different modes of ice motion. Thus, this system uses ice motion (as predicted by PIPS) and empirically-derived relationships to calculate noise levels at various frequencies.

The purpose of the Arctic Ambient Noise Prediction System is to produce two-dimensional contour maps of noise levels (dB) throughout the Arctic Basin. This is opposed to deploying numerous hydrophones on the ice pack and monitoring noise remotely. Moreover, this system can predict future noise levels by using the PIPS calculated ice motion out to 6 days. In addition to ice noise levels, the ocean climatological noise values are added to the grid when available and applicable. The current ice edge is found and then proper values are computed for the ice edges to complete the ice noise predictions. A secondary benefit of the system is the calculation of the various ice kinematic parameters (IKP). These parameters are of importance in their own right for various arctic operations.

The primary input to the system is the output of the PIPS. The PIPS output is processed to calculate the IKP for each grid point in the PIPS model domain. Seasonal empirical relationships are then used to calculate noise levels at each grid point of the PIPS model domain. Available ocean climatological noise values are added to the grid if the point in question is both a non-ice and a water point. Each grid point is tested for ice edge qualifications. After all the ice-edges are found, the values of under-ice noise are averaged for each non-ice point. A constant noise (dB) is added to the average which then replaces the original value at the ice-edge. Finally, these noise levels (at various frequencies) are output.

2.2 System Operation.

FNOC (Monterey, California) runs the PIPS model every 24 hrs with a 6 hr time step. Ice motion and concentration calculations

are made by FNOC out to 6 days in the future. These calculations provide operating and planning information for the Arctic Basin.

The output of the Arctic Ambient Noise Prediction system is in the form of listings and ZRANDIO noise intensity fields. These fields are accessed by the program VARIMAP to produce two-dimensional contour maps of noise intensities. This information is forwarded to the Joint Ice Center (Suitland, Maryland) for analysis and distribution to the fleet.

2.3 System Configuration.

The Arctic Ambient Noise Prediction system was written in Fortran 5 and executes on FNOC's CDC Cyber 855. The PIPS output is accessed from ZRANDIO files, and selection of run parameters is made via user input. The Climatological data is accessed from the U.S. Navy Shipping Noise Data Base and the selection of data is found via the season and noise frequency specified. The system is executed by a job control language AUTOFILE. Output is transformed to standard temperature fields in a ZRANDIO file and, if desired, a series of contour plots can be generated with a plotting program (VARIMAP) using an electrostatic plotter accessed by the Cyber 855.

2.4 System Organization.

This system is a self-contained Fortran 5 computer program written in a modular fashion. Here we present a general overview of the system, with descriptions of the roles of the various program components.

AMB - This is the main driver routine for the system. Run specification parameters are read in this routine, and all but one subroutine is called from this program. Error messages are generated from this program. The requested noise outputs are also written to MASFNWC from this program.

AMBPIP - This subroutine accesses the output files of PIPS. Non-sea ice grid points are identified.

AMBDIS - This subroutine calculates absolute positions for each time using the PIPS ice motion output.

AMBKIN - This subroutine calculates the IKP at each sea ice grid point of the PIPS model domain.

AMBDKP - This subroutine calculates the under-ice noise predictions based on DKP terms for a given frequency and season.

AMBAIA - This is the only routine that is not called from AMB. This routine calculates the 5% and 50% noise values for a

given frequency, month, and day of month. This routine is called by AMBDKP.

AMBLND - defines the land/sea/ice/ice-edge table for use in calculating the ice-edge values.

AMBLND steps through the spatial domain of the PIPS grid, checking the land sea table (ID) and the ice/non-ice table (D(I,J,6), non-ice = -99999). All land points are set to 0 in D(I,J,10). If for a given I,J, D(I,J,6) is an ice point, D(I,J,10) is set to 2. When a point is an non-land point and D(I,J,6) = -99999, D(I,J,10) is set to 1 as an ocean point. After all of the points are set as land, sea, or ice, AMBLND checks each ice point to see if there is an ocean point adjacent. If there is an adjacent ocean point that ice point is set to 3 as an ice edge.

AMBEDG - The ice edge noise values are calculated in AMBEDG. AMBEDG checks each point in D(I,J,10) looking for an ice edge (the value 3). If an ice-edge point is found, AMBEDG searches around that I,J for ice points. These adjacent ice points are averaged and a constant variable CONADD (sometimes called the "bump") is added to this average. This value then replaces the value in D(I,J,9).

AMBCLM - uses the data extracted from the U.S. Navy Shipping Noise Data Base (5 deg. lat/long resolution). A specified frequency is requested and AMBCLM interpolates the data for that frequency onto the PIPS grid. No spreading of the data is currently done.

AMBRD - uses FNOC routines to read in noise values from the U.S. Navy Shipping Noise Data Base for given frequencies for specified latitude/longitudes. Subroutine DBZGET is called with these lat/longs. If DBZGET returns frequency data, the lat/longs as well as the frequency noise values are put into an array VALUES. The total number of locations with data is returned as IVALCT and the noise values are returned in VALUES.

2.5 Performance.

The capability of the Arctic Ambient Noise Prediction system is the generation of the noise level estimates up to 6 days into the future throughout the Arctic Basin for a variety of frequencies. Inputs for each daily calculation are the following fields generated by the PIPS and stored on the MASFNWC file:

Ice concentration field,
Forecast 24 hr ice displacement field, and
Previous 24 hr ice displacement field.

Output from the system for each daily calculation are for each specified frequency as follows:

10 Hz noise level field,
32 Hz noise level field,
and/or 1000 Hz noise level field
as well as any 3 additional currently unspecified frequencies.

The noise level fields are written to disk.

Since the noise prediction system is based on the PIPS output, the system is limited to data fields of the dimensions of the PIPS model. The PIPS grid spacing is 127 km, and the PIPS field dimensions are 45 x 25.

Errors are noted by the noise prediction system, with one particular error causing program termination. This error is:

Incorrectly specifying grid cell size for the IKP calculations: The IKP are calculated using a least squares fit to the ice velocity gradients. Thus, one must specify how many grid cells about the central grid point are to be used in the calculation. This number must be 3, 5, or 7.

There can also be additional errors due to the fact that linear theory is used to calculate the IKP. Divergence, vorticity, normal deformation rate, and shear deformation rate are non-linear processes, but can be estimated using linear expressions if the time interval over which they are estimated is relatively short. The subroutine AMBDKP checks the validity of the use of linear estimates using specific criteria. If linear theory is found to be non-applicable at a given grid space, a counter is incremented and a message is written at the end of all the IKP calculations. This message indicates how many times such an error occurred, but processing continues.

Real-time processing by this system is dependent upon how many noise forecast are to be made. Noise forecasts can be made for each 24 hr PIPS model motion forecast, out to 6 days. Plots can be generated by Program VARIMAP for each frequency for each forecast. Typical real-time processing can be of the order of 30 seconds on the Cyber 855, with additional time required to plot on the electrostatic plotter.

The Arctic Ambient Noise Prediction programs were written in a modular form so that future modifications can be implemented.

Flexibility of the system is obtained by allowing additional frequencies to be predicted when empirical relationships are developed and by allowing additional environmental parameters (other than the IKP) to be used when needed. In addition, the system can be altered to handle 1) changes in the grid spacing or use of regional PIPS grids and 2) geographical tuning of the empirical coefficients.

2.6 Data Base.

The data files that are referenced by the noise prediction system are those of the PIPS output and those containing the noise level estimates. A brief description is given for each of these.

PIPS Model Output

PIPS Ice Concentration Field - This field contains ice concentrations as calculated by the PIPS for non-land grid points. No noise is calculated at grid points such that the ice concentration is less than X% where X is an input parameter to AMB. The range of values in the ice concentration field is 0% to 100%.

PIPS Ice Displacement Fields - These fields contain the net ice displacement (nautical miles) over the following periods: 0-24 hrs, 0-48 hrs, 0-72 hrs, 0-96 hrs, 0-120 hrs, and 0-144 hrs. These displacements are in terms of a series of progressive vectors, with each 24 hr forecast of displacement from a PIPS grid point added on to the previous forecast displacement. These fields are used to calculate the IKP for each grid point of the PIPS model domain.

U.S. Navy Shipping Noise Data Base

The USNSNDB ambient noise value is used at non-ice ocean points.

Ambient Noise Output

The noise prediction system calculates the 10 Hz, 32 Hz, and 1000 Hz noise levels (dB) for each PIPS model grid point for each desired forecast time (24, 48, 72, 96, 120, and/or 144 hrs). IFLAG, read from INPUT, indicates which noise records are to be output:

IFLAG2(1) = non-zero if 10 Hz noise is to be calculated,
IFLAG2(2) = non-zero if 32 Hz noise is to be calculated,
IFLAG2(3) = non-zero if 1000 Hz noise is to be calculated.

Contour Plot File - The noise records are written to the MASFNWC file. They are converted to standard 63 x 63 form by the routine ICETRNS. Contour plots may be produced by VARIMAP as requested in the JCL.

2.7 General Description of Inputs, Processing, Outputs.

The inputs to the Arctic Ambient Noise Prediction system consist of 1) a set of parameters that dictate what calculations are to be made plus 2) some variable fields from the PIPS model. The first inputs are read from the INPUT file and have the following format.

$n_1n_2n_3n_4n_5n_6$	A set of six flags which indicates the desired times for which noise levels are to be forecasted. A non-zero flag n_1 implies a 24 hr forecast, a non-zero n_2 implies a 48 hr forecast, ..., and a non-zero n_6 implies a 144 hr forecast. (6I1)
n	The number of grid cells about a PIPS model grid location used to calculate the velocity gradients of the ice. This n must be 3, 5 or 7. (I1)
RMS	The root-mean-square (rms) position accuracy (units of meters) of the PIPS model (if known). This is used to subtract out the biases in the least squares estimates of velocity gradients caused by rms position errors. (F10.0) (Default=0)
$n_1n_2n_3n_4n_5n_6$	A set of six flags which is the desired frequencies for noise levels are to be output. A non-zero n_1 indicates that 10 Hz noise levels are to be calculated, a non-zero n_2 is the indicator for 32 Hz, and a non-zero n_3 is the indicator for 1000 Hz. (6I1)

LL — A two digit number (in percent) which indicates the cut-off between grid points that should be considered ice or should be considered water. This is a measure of ice concentration. For PIPS model grid points that have concentrations of a least LL, noise calculations are made. (I2)

The other inputs to the noise prediction system come from the PIPS model output. These are as follows.

PIPS Ice concentration Field - This field contains concentrations as calculated by the PIPS for non-land grid points. Since the noise prediction system is for under-ice noise levels, no noise is to be calculated at grid points such that the ice concentration is less than X%, where X is an input parameter to AMB. The range of values in the ice concentration field is 0% to 100%.

PIPS Ice Displacement Fields - These fields contain the net ice displacement (nautical miles) over the following periods: 0-24 hrs, 0-48 hrs, 0-72 hrs, 0-96 hrs, 0-120 hrs, and 0-144 hrs. These displacements are in terms of a series of progressive vectors, with each 24 hr forecast of displacement from a PIPS grid point added on to the previous forecast displacement. These fields are used to calculate the IKP for each grid point of the PIPS model domain.

At the beginning of processing, the run parameters are read in from INPUT and all variables are initialized. After that, a program loop is begun for each prediction time. If a given time is to be forecast, the appropriate PIPS model output is read in from disk. A conversion is made from the progressive vectors of the PIPS output to absolute displacement relative to the PIPS model grid points. The IKP are then calculated for sea-ice grid points. After this, the process of making noise level calculations is begun. The month of the forecast and the frequency is used to find under-ice values. After the land/sea/ice/ice-edge table is calculated, the values for the ice-edges are calculated. Finally the U.S. Navy Shipping Noise Data Base is read and the under water noise values are used at those grid points. After having made all the noise level estimates the noise fields are output to MASFNWC. We then continue the loop on prediction times required.

Output from the noise prediction system is limited to two files. The first is an error file, (equivalent to OUTPUT). If the number of grid cells used in estimating the velocity gradients is not 3, 5, or 7 an error message is written to output and processing is terminated. If the IKP is too large at times to approximate by linear theory, a message is written to output

indicating how many times this occurred, but processing continues. If errors occur in the IKP calculations, appropriate messages are output and climatology values are used instead.

The noise fields are output to MASFNWC with standard 20 word idents.

Finally, it should be pointed out that two-dimensional contour plots may be produced. The hardcopy plots produced by VARIMAP consist of noise intensities contoured on a map of the Arctic Basin for each frequency at each forecast time. Contours are at 5 dB intervals and are labeled. These plots are produced by VARIMAP after program ICETRNS is executed.

2.8 Program and File Inventory.

An inventory of the programs and files for this system can be found in the Program Specification and Maintenance Manual.

Section 3. Staff Functions Related to Technical Operations

3.1 Initiation Procedures.

To initiate a run of the Arctic Ambient Noise Prediction system, the appropriate AUTOFILE is executed. There are 5 input lines required in the AUTOFILE. These are as follows:

Line 1: $n1n_2n_3n_4n_5n_6$	A set of six flags which represents the desired times for which noise levels are to be forecasted. A non-zero flag n_1 implies a 24 hr forecast, a non-zero n_2 implies a 48 hr forecast, ..., and a non-zero n_6 implies a 144 hr forecast. (6I1)
Line 2: n	The number of grid cells about a PIPS model grid location used to calculate the velocity gradients of the ice. This n must be 3, 5 or 7. (I1)
Line 3: RMS	The root-mean-square (rms) position accuracy (units of meters) of the PIPS model (if known). This is used to subtract out the biases in the least squares estimates of velocity gradients caused by rms position errors. (F10.0) (Default=0)
Line 4: $n_1n_2n_3n_4n_5n_6$	A set of six flags which is the desired frequencies for which noise levels are to be output. A non-zero n_1 indicates that 10 Hz noise levels are to be calculated, a non-zero n_2 is the indicator for 32 Hz, and a non-zero n_3 is the indicator for 1000Hz. The remaining flags are reserved for future expansion. (6 I1)
Line 5: LL	A two digit number (percent) which indicates the cut-off between grid points that should be considered ice or should be considered water. This is a measure of ice concentration. For PIPS model grid points that have concentrations of a least LL, noise calculations are made. (I2)

An example of these inputs is:

Column 1 6	
111000	Request Forecast Times
3	N x N Points Used in Calculating IKP
0.0	RMS Position Error of Model
101000	Requested Frequencies
70	Minimum Ice Concentration (Percent)

The above input would generate 24, 48, and 72 hr forecasts of 10 and 1000 Hz noise levels. The PIPS model grid points which have ice concentrations of less than 70% would not be included in the calculations, and the IKP would be calculated using a 3 x 3 set of grid locations around each PIPS model grid point. The root-mean-square position error would be set at 0.0 meters.

3.2 Staff Input Requirements.

Under standard operational conditions, the Arctic Ambient Noise Prediction routine would be run on the same time interval as the PIPS. Currently this is once every 24 hrs. All inputs listed in the previous section (3.1) must be entered. In most cases, this input will be standardized, and the operational staff will only be required to initiate the execution of the system.

3.2.1 Input Formats.

The formats of the input (INPUT file) are as follows:

	Column 1 2 3 4 5 6 7 8 9	
Line 1	$n_1n_2n_3n_4n_5n_6$	(6I1)
Line 2	n	(I1)
Line 3	X X X X X X X X X	(F10.0)
Line 4	$n_1n_2n_3n_4n_5n_6$	(6I1)
Line 5	L L	(I2)

3.2.2 Composition Rules.

There are several conventions that must be followed in preparing input (see above). Concerning the input file, the reader should refer to section 3.1 for a review of the functions of the various parameters.

Line 1 - All flags are one digit indicators with forecast made for those times with the digit equal to 1 and no forecasts made when the digit is 0.

Line 2 - A one digit number that must be 3, 5, or 7. The current system uses 3.

Line 3 - Up to a ten digit number (including decimal point) that must be right justified in the first ten columns if no decimal point is entered. The current system uses 0.

Line 4 - All flags are one digit indicators with noise calculations made for those frequencies with the digit equal to 1 and no noise calculations made when the digit is 0.

Line 5 - Up to a two digit number.

3.3 Output Requirements.

The two sets of output generated by the noise prediction programs consist of a message file and noise output. The output file contains messages which indicates any errors during the processing of the data.

The under-ice noise estimates are saved on MASFNWC. By modifying the input parameters (section 3.1), one may chose to calculate (and save) particular forecast times and specific frequencies.

Two-dimensional contour plots may be generated for each run as requested in the AUTOFILE. The plot file is automatically deleted after the plotting process.

3.3 Output Formats.

The output of error messages will have the following formats:

```
"ERROR IN N (SIZE OF GRID ELEMENT TO CALCULATE IKP)
 N = k (MUST BE 3, 5, 7)"
```

where k is the value of N. Program execution is terminated.

```
"WARNING:  THE MAGNITUDE OF THE DIFFERENTIAL MOTION OF
           THE ICE WAS AT TIMES TOO LARGE TO APPROXIMATE
           BY LINEAR THEORY.  THIS OCCURRED k TIMES."
```

where k is the number of times that error occurred. Program execution is continued for this error.

The noise records are in standard FNOC format with 20 word idents.

3.3.2 Sample Outputs.

Sample outputs of errors are shown in the above section.

3.3.4 Utilizations of System Outputs.

The message output is to be used to correct errors in the AUTOFILE input and to assess the reliability of the noise output fields. The former purpose is straightforward, but the latter purpose needs clarification.

The noise routines use linear theory to calculate the ice kinematic parameters over the time step of the PIPS model. Although the governing equations are actually exponential in time, they can be approximated by linear expressions if the ice divergence, vorticity, normal deformation rate, and shear deformation rate are small enough with respect to the time step. If the criteria is not met, then the program is essentially trying to approximate the exponential function with a linear expression. This of course will lead to errors in the values of the IKP which will lead to errors in the under-ice noise levels.

The utilization of the linear theory warning in the message file is the assessment of how reliable the noise calculations are. Since the PIPS model has approximately 800 non-land grid points, an error count of over 50 or 60 for the linear theory warning could be expected to produce some spurious noise level concentrations.

3.5 Recovery and Error Correction Procedures.

The recovery from errors caused by mistakes in the input file can be made by following the instructions in sections 2.7 and 3.1 in this manual. For errors due to the use of linear theory, the only recovery is to run the PIPS at a smaller time step. The most recent research into observed ice kinematics implies a model time step of at most 6 hrs. If running the PIPS at a smaller time step is not feasible, the calculated noise levels should be marked suspect and distribution should be limited.

APPENDIX A

SAMPLE JCL

Appendix A. Sample JCL

```
JOB,STOPS,EC150.    AANPS
COMMENT.   ARCTIC AMBIENT NOISE PREDICTION SYSTEM
LIBRARY,*FNWCLIB,*OCNLIB.
COPYBR,INPUT,CRDATE.     RUN TIME
MAP,PART.
APLIB(MT1731,*ICETRNS,*AMB)
COMMENT.
COMMENT.  IF CLASSIFIED, MOUNT CPACK AND SHARDSK
COMMENT.
IF(CLASS,EQ,0,COMMENT,F)            SKIP FOR UNCLASS
MOUNT(SN=CPACK)
MOUNT(SN=SHARDSK)
COMMENT.  SKIP FOR UNCLASS
COMMENT.
LDSET(SUBST=DDTG-RUNTIME)
AMB.                RUN ARCTIC ICE AMBIENT NOISE PROGRAM
LDSET(SUBST=DDTG-RUNTIME)
ICETRNS.            CONVERT 47 X 25 TO 63 X 63 GRIDS
ROUTE,PLOT,DC=PT,TID=C,BIN=xx,CO=$AANPS PLOTS$,DEF.
LIBRARY(*FNWCOVL)
ONSW(6)                             USE CRDATE
VARIMAP.
ROUTE,PLOT,DC=PT,TID=C,BIN=xx,CO=$AANPS PLOTS$.
EXIT.
COMMENT.
COMMENT.  THIS JCL CAN RUN ON EITHER THE CLASSIFIED OR THE
COMMENT.  UNCLASSIFIED MACHINES. IF THE MACHINE IS CLASSIFIED
COMMENT.  THE DISKPACKS (CPACK AND SHARDSK) ARE MOUNTED.
COMMENT.  AMB IS RUN TO COMPUTE  THE ARCTIC AMBIENT NOISE.
COMMENT.  ICETRNS IS RUN TO TRANSFORM THE 47 X 25 FIELDS TO THE
COMMENT.  STANDARD FNOC 63 X 63 FIELDS.  VARIMAP IS CALLED TO MAKE
COMMENT.  VARIAN PLOTS.  AMB IS CURRENTLY SET TO RUN FOR 3 TIME
COMMENT.  STEPS (0-24, 0-48, 0-72), SUBGRID OF 3 X 3, RMS ERROR OF
COMMENT.  0.0, 3 FREQUENCIES (10, 32, AND 1000HZ), AND AN ICE
COMMENT.  CONCENTRATION CUTOFF OF 80%.  THE AMB, ICETRNS, AND
COMMENT.  VARIMAP INPUT THAT FOLLOW ARE SET IN THIS SAMPLE JCL AS
COMMENT.  INDICATED ABOVE.
*EOR
```

```
CURRENTDTG-12
*EOR
111000
3
0.0
111000
80
*EOR
047025  33.5   32.0   .32    .0
063063  33.0   32.0   .25    .0
MASFNWC   MASFNWC    PP1 00000000100001195++1.
MASFNWC   MASFNWC    PP2 00000000100001195++1.
MASFNWC   MASFNWC    PP3 00000000100001195++1.
MASFNWC   MASFNWC    PP1 00002402400001195++1.
MASFNWC   MASFNWC    PP2 00002402400001195++1.
MASFNWC   MASFNWC    PP3 00002402400001195++1.
MASFNWC   MASFNWC    PP1 00004804800001195++1.
MASFNWC   MASFNWC    PP2 00004804800001195++1.
MASFNWC   MASFNWC    PP3 00004804800001195++1.
*EOR
11             4 3200 3100 1400                 360.              PI
LOCPP1+13600 39892  63 63    5.0    .01      0   50.016100        31 31
VICE1          1 1    46  32 31  6
11             4 3200 3100 1400                 360.              PI
LOCPP2+13600 39892  63 63    5.0    .01      0   50.016100        31 31
VICE1          1 1    46  32 31  6
11             4 3200 3100 1400                 360.              PI
LOCPP3+13600 39892  63 63    5.0    .01      0   50.016100        31 31
VICE1          1 1    46  32 31  6
*EOR
0        1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
(etc., FOR OTHER TAUS OR PARAMETERS)
```